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ABSTRACT

Studies that conclude that class size makes no difference are based almost entirely on student achievement of cognitive scores, whereas those studies that find class size significant include other important factors such as creativity, decline of learning and behavior problems, better class control, problem-solving and retention, and the amount of opportunity for each child to participate and express himself orally. "Indicators of Quality," an instrument measuring individualization, interpersonal regard, group activity and creativity, has revealed a near perfect linear relationship between class size and quality of the educational process. Generalizations about educational quality drawn from over sixty class size studies, and supported by their data, show that with a small class size: (1) teachers provide a wider variety of instructional methods and learning activities; (2) students benefit from more individualized instruction; (3) students engage in more creative and divergent thinking processes; (4) students learn to function more effectively as group members and leaders; (5) students develop better human relations skills; (6) students learn basic skills better and master more subject matter content; (7) classroom management and discipline are better; (8) teacher attitude and morale are more positive; and (9) student attitudes and perceptions are more positive. Seventy-two documents are cited in the list of references on class size and educational effectiveness. (MB)

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The Question of Class Size

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The Question of Class Size

Introduction

The size of a class affects the quality and quantity of student learning that occurs within the group. The more help and personal attention available for each individual - - by reduced class size - - the greater the benefit each student will receive from the teacher's efforts.

The size of every regular class should be reduced to the point at which the teacher can effectively develop the skills and abilities of each of his students. Since the generally accepted upper limit for effective teaching in any regular classroom is 25 students, no regular classroom should exceed this number.

Some special classes should be smaller than 25. Examples of these include:

- Shop and laboratory classes where close supervision by the teacher is necessary for the safety of the student.
- Remedial instruction, where the child requires tutorial help.
- Training for handicapped children, such as the mentally slow and the emotionally disturbed, where little learning occurs without constant individual attention from the teacher.
- Acceleration for exceptionally talented students, such as courses intended to prepare scholars for advanced placement in college.
- Writing classes, where teachers must spend hours evaluating student compositions.

Does Class Size Make A Difference?

YES, class size continues to be identified as a major problem confronting the public schools as reported in the Seventh Annual Gallup Poll of Public Attitude Toward Education.[1] This reliable source of public opinion about significant school questions reported that the top ten (10) problems confronting public schools were: (1) Lack of discipline; (2) Integration/segregation/busing; (3) Lack of proper financial support; (4) Difficulty of getting "good" teachers; (5) Size of school/classes; (6) Use of drugs; (7) Poor curriculum; (8) Crime/vandalism/stealing; (9) Lack of proper facilities; and (10) Pupils' lack of interest. Now, more than ever before, the teaching profession in concert with the community faces the challenge of building broader support and implementation of smaller class size.

Research data on class size are conflicting; however, a review of studies shows the following:

A. There are twice as many studies in favor of smaller classes over larger classes, although there is wide variation among school systems and teachers about the meaning of a small and large class.

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[1] Phi Delta Kappa, Vol. 57 No. 4, December 1975, p. 238.

B. The studies based on the largest samples agree that class size is important to the quality of education.[2]

1) The first year's (1973-74) evaluation of California's massive early childhood education (K-3) program shows that students made "substantial and unprecedented gains in achievement." The adult-pupil ratio was 1-10. The 172,073 children in 800 districts involved made an average gain in math of 12 months for every 10 months of instruction; in reading, 11 for 10 months.

2) In the most extensive survey every undertaken in American education (18,520 classroom observations made in 112 school systems during a seven-year period), Dr. Olson (1971) flatly states, *"Any way one tries to slice it, smaller classes produce significantly higher scores than large ones."*[3]

C. Smaller classes and a stable teaching staff can dramatically improve the behavior of inner city students.[4]

D. Small classes tend to have more variety and individualized instructional methods than do larger classes.

E. There is a trend for school boards to offer teachers larger classes in exchange for higher salaries. Dollar-wise, this trade-off does not provide the teacher a salary gain that is commensurate with the average salary cost per pupil.[5]

F. Those studies which conclude that class size makes no difference are based almost entirely on student achievement of cognitive scores whereas those studies which find class size significant include other important factors as creativity, decline of learning and behavior problems, better class control, problem-solving and retention, and the amount of opportunity for each child to participate and express themself orally.

In Ohio, the "Educational Goals" adopted by the State Board of Education in June 1973, clearly state that factual learning (basic skills) is only one of the priorities of education. Equally important are capabilities of aesthetic experience, personal development, learning to be a learner, and mental health.

Do Regulating Agencies Suggest Class Size Standards?

(A.) YES, The Ohio State Board of Education has established Board goals at the State level expecting these goals to be implemented through the district, county, city, and individual school buildings. The individual school building is to implement these minimum standards as they relate to class size:

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[2]Sitkei, George E., The Effects of Class Size: A Review of the Research, Research Study Series, 1967-68, (Los Angeles: Los Angeles County Superintendent of Schools, 1968).

[3]Olson, Martin, Classroom Variables That Predict School System Quality. Research Bulletin 11, November 1970.

[4]Rogeness, G. A., Bednar, R.A., Diesenhaus, H., The Social System and Children's Behavior Problems, American Journal-Orthopsychiatry, 44, July 1974, 497-501.

[5]Hall, Clayton W. and Carroll, N.E., The Effect of Teachers' Organizations on Salaries and Class Size. Industrial and Labor Relations Review, Vol. 26, Jan. 1973, 834-841.

Elementary Schools: Standard EDb-401-05 (1970)

Level I-30-1
Level I is a basic minimum.

Level II-25-1: Kindergarten and 1st grade, 22-1
Level II suggests direction for development beyond the minimum standards.

The pupil-teacher ratio in each building shall not exceed 30 pupils. It shall be determined by dividing the total school enrollment in each building by the total teaching staff which is actively engaged in instruction. This figure includes both full-time and part-time teachers with the part-time instructional service computed on a prorated basis.

Junion High Schools: Standard EDb-405-04 (1968)

No more than 180 pupils per day to be instructed. The teaching staff in this figure includes all properly certificated persons actually involved in the instruction of pupils: teachers, librarians, and administrators employed in full-time instruction and the full-time equivalency of part-time instruction. The maximum of 180 pupils per day for a teacher may be an average, in the program of flexible scheduling which may involve large and small group instruction, to cover the established period of time involved, exclusive of study halls and certain activity-type classes such as typing, physical education, and music.

High Schools: Standard EDb-403-04 (1968)

No more than 180 pupils per day to instruct. The pupil-teacher ratio is arrived at in the same manner as for the Junior High Schools.

(B.) The North Central Association of Colleges and Schools[6] also have established policies and criteria for approval of schools and their pupil-professional staff ratio. These 1975-76 standards as they relate to class size are:

Elementary Schools: Standard 4.20; 4.22; and 4.23

4.20 Pupil-Professional Staff Ratio. The ratio of pupils to teachers and other professional staff members shall not exceed 25 to 1. Only that portion of a staff member's time actually devoted to duties in the elementary school may be counted in determining the pupil/professional staff ratio.

4.22 Teachers. The number of teachers employed in the elementary school shall be adequate to provide effective instruction, direction of non-class activities, counseling, and other educational services.

4.23 Planning/Conference Time. Within the teacher's workday, each teacher shall have a minimum of two hundred minutes per week scheduled for conferences, instructional planning, and preparation.

Junior High Middle Schools: Standard 5.24

The staff shall consist of at least one certificated person for each 25 students and should consist of at least one certificated person for each 20 students.

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[6]North Central Association of Colleges and Schools, Commission on Schools, 5454 South Shore Drive, Chicago, Illinois 60615.

Secondary Schools: Standard 4.60

The ratio of pupils to teachers and other professional staff members shall not exceed 25 to 1. Only that portion of a staff member's time actually devoted to duties in the high school may be counted in determining the pupil-teacher ratio. The number of teachers employed in the high school shall be adequate to provide effective instruction, direction of extra-classroom activities, counseling, and other educational services.

Published Research Supporting Small Class Size

Class Size and Pupil Learning[7]

New Teaching Practices and Class Size

In 1955, Harold Richmond reported from his research at Teachers College, Columbia University on "Educational Practices as Affected by Class Size" that 62 selected practices in middle elementary grades indicated that:

1. Desirable practices tend to be dropped when class is increased.
2. Desirable practices are added when class size is reduced.

Richmond further discovered that where class size had been deliberately reduced, practices designed to evoke individualized concern become evident. Teachers show greater

1. Understanding of children
2. Use of children's aptitudes and needs
3. Discovery and development of individual talents
4. Encouragement of individual exploration

Where class size increased, the aforementioned practices of individual concern were used with less frequency, situations became more formalized, and teachers took refuge in routines to assure that all children were drilled principally in basic skills.

In 1955, Robert C. Whitsitt reported his research at Teachers College, Columbia University on "Comparing the Individualities of Large Secondary School Classes (English and Social Studies) with Small Secondary School Classes Through the Use of a Structural Observation Schedule." Whitsitt reported that he found that teachers of classes which were small by design (less than 24 children) tended to use a greater variety of instructional methods than did teachers of comparable ability in larger classes.

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[7]Furns, Orlando F. and Collins, George J., Class Size and Pupil Learning, Baltimore City Public Schools, October 2, 1967.

Summary of Class Size Findings in Study of Baltimore City Public Schools

Students in the regular curriculum and in smaller classes made significantly greater gains in pupil achievement (on both standardized reading and arithmetic tests) over the five--year period (1959-1964) in 188 comparisons to 55 students in larger classes - - a 3.4 to 1 ratio in favor of smaller over larger classes.

These results were attained even though in most instances the pupils in larger classes benefited more significantly from such favorable supporting characteristics as parental education, faculty knowledge, and faculty teaching experience.

When pupil achievement is analyzed separately for reading and arithmetic, the results are as follows:

1. The students in the smaller classes made significantly greater gains in reading over the five-year period (1959-1964) in 92 comparisons to 26 for students in larger classes - - a 3.5 to 1 ratio; and

2. The students in the smaller classes made significantly greater gains in arithmetic over the five-year period (1959-1964) in 96 comparisons to 29 for students in larger classes - - a 3.3 to 1 ratio.

The most important finding of this study relates to the smallest class size grouping (1-25 students). Out of 192 comparisons, pupils in the smallest class size grouping made significantly greater gains in pupil achievement than those in larger classes in a ratio of 7.3 to 1. Stated differently, 117 comparisons (61 percent) favored pupils in the smallest class size grouping (1-25), 16 comparisons (8 percent) favored pupils in larger classes, and 59 comparisons (31 percent) showed no significant differences favoring either smaller or larger classes. Also, it should be noted that smaller classes made these significant gains in reading and arithmetic achievement despite the fact that the pupils in smaller classes benefited significantly more from such supporting characteristics as parental education, faculty knowledge, and faculty experience in only 32 percent of the comparisons.

In 96 group comparisons, nonwhite pupils in the smallest classes made significantly greater gains in reading and arithmetic over these in larger classes by a ratio of 21.3 to 1. Stated differently, out of 96 comparisons, nonwhite students in smaller classes made significantly greater gains in achievement in 64 comparisons (66 percent), nonwhite students in larger classes made significantly greater gains in achievement in 3 comparisons (3 percent), and 29 comparisons (30 percent) favored neither nonwhite students in larger nor in smaller classes.

Students in the special education curriculum and in smaller classes made significantly greater gains in pupil achievement (on both standardized reading and arithmetic tests) over the five-year period (1959-1964) in 38 comparisons to 3 for students in larger classes - - a 12.7 to 1 ratio favoring smaller over larger classes.

Ways to Achieve Quality in School Classrooms

Some Definitive Answers[8]

The principle intent of this study was to develop accurate means of obtaining answers by which to judge the general quality of the educational process in any school classroom. The criterion of classroom quality used in this study was Indicators of Quality, a new measure of school system process developed, field tested, and refined over a period of some seven years. A highly reliable and valid measure of quality, it was specifically designed to assess a school system's classroom processes on four criteria: individualization, interpersonal regard, group activity, and creativity. Trained observers, using a structured observation guide, obtain data convertible to a quantitative score for each situation observed.

In all, 18,528 classroom observations were conducted in 112 largely suburban school districts located in 11 metropolitan regions across the United States. These classrooms, 9,961 elementary and 8,567 secondary, are the composite of all school districts which had Indicators of Quality applied, through June, 1969, representing metropolitan New York State, New Jersey, Connecticut, Boston, Cleveland, St. Louis, Chicago, the Midwest, the Denver-Rocky Mountain area, the Baltimore-Delaware area, and western Washington State.

In all likelihood these systematically gathered, objective data from nearly 20,000 public school classrooms represent the most extensive survey of American education ever undertaken in one study.

Seven internal classroom variables, listed in order of importance, explained significant proportions of the criterion score variance at both the elementary and secondary grade levels: the style of educational activity, subjects taught, class size, grade level, type of teacher, number of adults, and day of the week. That is, these seven variables were found to be highly predictive of school system quality.

The relationship between class size and the criterion scores was well defined and consistent throughout each level of analysis. Any way one tries to slice it, smaller classes produced significantly higher scores than larger ones. Table I reveals this near-perfect linear relationship for both elementary and secondary classrooms. Special recognition should be given to the critical "breakpoints" between class sizes where sharp drops occur in the performance scores indicated with arrows in the table. With little question, it would be well for school systems to consider altering their class size ratios if close to and on the wrong side of a critical breakpoint, such as 26-1 ratio in elementary, or 16-1 in secondary.

TABLE I

ELEMENTARY AND SECONDARY OBSERVATIONS SCORED BY CLASS SIZE

	Elementary		Secondary	
Class Size	N	Scores	N	Scores
Under 5	155	10.61	77	8.31
5-10	218	8.34	505	8.45
11-15	310	8.34	1,248	6.25
16-20	1,395	7.26	2,052	4.77
21-25	3,736	5.45	2,427	4.25
26-30	2,898	4.73	1,361	3.93
31-35	931	4.66	361	3.51
36-40	129	3.17	136	4.41
41-50	64	4.38	121	3.65
50+	94	2.22	260	3.22
Total observations	9,961		8,567	
Mean scores		5.96		4.83

[8]Olson, Martin N., Phi Delta Kappa, "Research Notes: Ways to Achieve Quality In School Classrooms: Some Definitive Answers." September 1971.

Summary of Additional Research Findings that Support Small Class Size

A main consideration is that the need for education in America today is not the same as in 1900. Citizens have far greater and different demands placed on them in their occupational and personal lives. Witness the changes in employment, in family stability and mobility patterns. The knowledge explosion alone has brought overwhelming demands on the schools. Urbanization and instant communication media add their share of pressures. Advances in technology and competition in new businesses and industry have brought job qualification requirements to unprecedented levels, requirements based on different and more complex skills. Professional and semiprofessional fields have vastly expanded, and there are fewer enterprises and businesses which can be passed on to sons and daughters: there is very little in the way of security that parents can pass on to their children, except an education. And an education is needed, indeed is absolutely essential, that prepares individuals to shift, adjust, and respond positively to the fast pace of changing societal and world forces.

One of these actions is to document what happens when fewer students are placed with more teachers in educational settings. Teacher associations require a firm base of knowledge of what works if they are to successfully influence local school district priorities and reformulation of existing school policies. Much evidence can be found in the research and theoretical literature on learning which clearly specifies the actual learning conditions and learning outcomes that are achieved when teachers have fewer rather than more students in their charge.

The main practical question becomes, "What really takes place in smaller classes?"

Definitive answers to this question are presented in this section. They are found in nine highly defensible generalizations and descriptions of findings drawn from over sixty of the most dependable class size references available. These references are of sound substance and high quality.

Classified by the generalizations to which they offer support, the references primarily represent single studies and investigations which provide findings, rationales, and conclusions on what takes place when teachers face fewer rather than more students. However, some of the nine generalizations and evidence supporting them included here have been obtained from ten broader and more general class size reviews (6, 26, 30, 32, 36, 49, 58, 59, 63, 65). For these references more reliance has been placed on the conclusions offered by the reviewers. Two of these reviews deal with research results in postsecondary education (32, 56), as do two of the individual studies (7, 16). These are included for their unique contributions to the literature.

Following each of the nine generalizations, descriptions and examples of teacher and student behaviors are presented. These behaviors - - learning outcomes, skills, procedures, techniques - - are taken directly from the references. They represent what has been shown to actually take place in smaller classes.

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[9]Olson, Martin, N., Associate Professor and Chairman - Department of Education, Occidental College, Los Angeles, August 1975.

Some Dimensions of Size

Smaller classes.[10] Smaller than what? Smaller than 35, 16, or 80? One can find in some particular study or a particular school that each of these numbers has been considered small or that each has been considered large when compared to other classes of varying sizes. There has been no consistent definition as to what constitutes a large or a small class. But it is possible to view class size on a continuum from very small to very large. So the following continuum is proposed here as a framework for viewing the nine generalizations:

1 - 15	students	=	very small
11 - 25	students	=	small
26 - 35	students	=	large
36 +	students	=	very large

This continuum is based on the following:

1. The expert judgment of teachers and administrators as to most effective and least effective class sizes (41,24).

2. The percentages of various class sizes attained in K-12 public school systems judged to be average or superior (65.8% of all classes in these schools contain 25 or fewer students and only 4.3% contain 36 or more students) (46, 4).

3. The quality of the instructional process and the educational outcomes achieved for the class sizes. (In the majority of references examined for this paper really superior quality appears to require 15 or fewer students.)

Besides providing some bench marks, this continuum can be used to help bring more consistency to the study of local school conditions. For example, when students meet with teachers for instructional purposes, it can be determined what percentages of those meetings during a week fall at the various size points on the continuum. Having such data available each year can help school districts or schools change or develop policies in closer agreement with school goals and community objectives.

The nine generalizations follow with supporting references for each generalization are cited by bibliographic number listed in order of recency or overall directness of support. A number of the references give support to two or more generalizations.

Generalization I: Teachers employ a wider variety of instructional strategies, methods, and learning activities and are more effective with them when they work with fewer rather than more students.

Simply put, teachers who have fewer students are more innovative. Not only do they invent more new practices, but they are more likely to be the first to introduce into their classrooms practices developed by others.

[10]Class is defined here as the number of students meeting with a teacher for a specified period of time for instructional purposes.

These practices are characterized by greater student involvement and participation, both physical and mental, as they interact more frequently with other students, with the teacher, and the teacher with them. Emphasis is placed on teaching methods and strategies in which the teacher plays a more active rather than passive role. Lecture and presentation are used less often, and more opportunity is provided for individual student practice and discussion of ideas. Less time is spent on formal testing and recitation and more time is devoted to laboratory work and demonstration. Student developed projects and learning activities through work in the community take precedence over paper-and-pencil busy-work activities. All students do no engage in the same activities - - differences in interests and needs are taken into account.

Not only do these practices occur more often, but so do other interactive strategies which call for detailed teacher preparation and greater skill by teachers and students in implementation. Examples of these are brainstorming, values clarification exercises, personal discussion for content transfer, role playing, simulations of real-life experiences, sociodramas, task-oriented small groups, forums and debates. In order to deal with the broad content covered through these methods, teachers and students use a greater variety of educational materials, media, and other concrete devices to supplement textbooks. Textbooks less often become the sole basis for information, authority, and discussion.

Where there are small classes, teachers provide students with more learning activities and instructional exercises which give practice in generalizing, outlining, creating, listening actively, executing manipulative or motor skills, or developing academic area skills.

Supporting References. By far the greater proportion of the research evidence and professional opinion is centered on this generalization and the four related ones immediately following. Fourteen references give direct and largely unequivocal support for this generalization: 44, 53, 71, 52, 1, 10, 47, 46, 34, 6, 36, 58, 32, 30. Seven professional opinion references give explicit detail and examples of effective teaching practices: 14, 60, 61, 28, 25, 40, 66.

Generalization II: Students benefit from more individualized instruction when teachers work with fewer rather than more students.

Teachers have and use greater knowledge of individual pupils - - their unique skills, interests, goals, styles of learning, personal background, and rates and manners of cognitive development - - and they use this knowledge to structure the learning environment to maximize opportunities for each student's growth and development.

Differences in attitudes, human values, emotional maturity, and personal sensitivity are recognized and become the basis for increased student motivation to work and achieve. And there are also increases in differential task assignments, modification of questioning techniques to improve understanding, provision for help and enrichment outside regular class time, and use of a variety of resources to meet individual requirements such as programmed materials, audio-visual aids, newspapers, specimens, crafts, tools, magazines, and books.

Further, students have more opportunity for adopting a variety of roles that enhance important educational, communication, and social skills: sharing ideas and perceptions with many other individuals, including the teacher, and modifying behaviors to interact with others who are quite different. Such interaction leads to acceptance of individual responsibility for becoming more effective in planning, in monitoring one's own work and study time, in determining the direction and content of lessons, and in learning how to initiate change.

Supporting References. Sixteen references support this generalization: 27, 17, 12, 11, 7, 57, 47, 46, 5, 31, 2, 53, 71, 52, 34, 37. Amplified descriptions of individualized procedures are provided in four sources: 29, 14, 40, 35.

Generalization III: Students engage in more creative and divergent thinking processes when teachers work with fewer rather than more students.

There is more freedom to test ideas, to speculate without fear that incorrect answers will be penalized in some way. New ideas are entertained by both students and teachers in settings in which open respect lessens anxiety and tension. Students can take the time to play with an idea, initiate an activity or project beyond the content of a lesson, formulate hypotheses and predict outcomes, and experiment in a variety of ways not prespecified by the teacher.

A learning environment is possible that allows students to practice the skills of critical and creative thinking: analyzing, summarizing, abstracting, evaluating, inquiring, generalizing, outlining, and various other manipulatory intellectual and verbal processes.

Supporting References. Evidence to support this generalization is less readily available than for some others, perhaps because American schools have been less attentive to this area. Frequently in American schools and society both rewards have been given for convergent thinking - - for conformity to established norms of behavior and beliefs held by those in status and authority positions. Teaching creative thinking is a considerably more complex process than teaching skills and convergence, especially for teachers who themselves may have experienced less exposure to creativity as they went through the K-12 curriculum or as they completed liberal arts and teacher preparation programs in the colleges and universities. Even so, seven references support this generalization: 48, 47, 46, 10, 29, 32, 65. (Reference 29 contains a review of research and writings of 27 authorities on creativity.)

Generalization IV: Students learn how to function more effectively as members and leaders of groups of varying sizes and purposes when teachers work with fewer rather than more students.

Teachers stress the importance of group functions for instructional purposes and content mastery and use techniques or procedures which give students actual practice in a variety of roles which are complex to master. Students learn the important skills of decision making, how to make conflict serve constructive purposes and how to reduce it, ways to work cooperatively, methods of fair and accurate group evaluation, and how to set and achieve meaningful goals. Internal interdependency, cohesiveness, and syntality (the "we-ness" to important to group personality and ongoing success) are better perceived and understood by students. In effect, they gain more balanced perspectives on democratic processes and interpersonal behavior, how to compromise personal choice and whims for the betterment of social, political, and economic conditions affecting others.

When teachers have fewer students in their charge, a broad range of types of group activites and skill-development exercises as listed above are more frequent and of higher quality.

Supporting References. Seventeen references support this generalization: 23, 8, 46, 47, 10, 56, 64, 34, 52, 71, 53, 60, 69, 58, 29, 66, 25. References 23, 8, 56, and 64 support smaller sizes for effective individual skill development in group processes.

(The vast majority of social psychology and general social science research investigations have been conducted primarily with groups numbering from two to fifteen in size.) Reference 60 contains detailed procedures and examples of how to "develop" groups of various sizes for a variety of purposes.

Generalization V: Students develop better human relations with and have greater interpersonal regard for other students and their teachers when teachers work with fewer rather than more students.

The general emotional tone and climate of the learning environment are characterized by more warmth, courtesy, empathy, kindness, consideration, and respect among students and teachers.

Teacher behavior is more relaxed, good-natured, and appropriately humorous in order to promote patience, acceptance of pupil handicaps, and an atmosphere of cooperativeness.

Students are more likely to learn to respect the opinions of others, and problem-solving activities are freer of conflict and hostility. External coercion by the teacher to control behavior is less often required. In effect, there is greater mutual respect and trust among students and between students and the teacher. The teacher meets and works with students on their level as opposed to being aloof, superior, authoritarian, distant, and withdrawn. Thus instead of being apathetic, reluctant, and slow to respond to educational activities and tasks, students make more voluntary contributions, show greater initiative, and are more prompt, eager, and enthusiastic about participating.

Supporting References. Sixteen references support this generalization: 57, 7, 1, 8, 17, 71, 47, 46, 10, 5, 16, 29, 69, 11, 27, 65.

Generalization VI: Students learn the basic skills better and master more subject matter content when teachers work with fewer rather than more students.

Students achieve better in nearly all skills and subjects, but especially in language arts, reading, mathematics, physical and mechanical skills, science, social studies, spatial relationships, and reasoning.

Not only do students understand the basic concepts and information particular to subject areas, they also recognize and recall more important facts and details. This knowledge attainment is facilitated by more frequent use on the part of students of the following higher order thinking skills: analyzing materials and data; making inferences and interpretations; sorting facts from opinion; and making evaluative judgments based on designated standards. Increased practice in such skills results in greater accuracy in perceiving cause-and-effect relationships shown by students in the transfer and application of knowledge and thinking skills to different problem situations and personal real-world experiences which confront them.

Gains in the acquisition and retention of various kinds of knowledge also come from concomitant improvement inspecific reading and study skills, epecially for lower achieving students. In related writing, listening, and speaking skills, students show more fluency and proficiency in giving examples, providing descriptions, using vocabulary, making comparisons, and in contrasting ideas and sequencing them in logical order when they are in smaller classes.

Supporting References. A number of high-quality studies of achievement have been conducted recently and more are appearing. Fifteen studies provide solid support for this generalization: 70, 62, 20, 3, 6, 19, 45, 72, 50, 37, 11. (Reference 6 reviews five such studies.) Reference 70 warrants special attention. It is an impressive study of all selective service draft candidates who failed the test of general mental abilities (vocabulary, math, spatial, and mechanizal items) in 1969-70. The results of this study show conclusively that low pupil-teacher ratios make great positive differences in test performance and equality of opportunity. References 62, 20, and 3 were the only longitudinal studies identified and were carefully controlled investigations. Not only do the results of these reveal large gains in achievement, but academic growth was found to be cumulative from year to year.

Generalization VII; Classroom management and discipline are better when teachers work with fewer rather than more students.

Students commit fewer aggressive acts like fighting, shoving, pushing, crowding, and striking. Their frustrations are fewer and teachers are better able to diagnose causes of misbehavior and to deal effectively with individuals before major problems occur. As a result there are fewer interruptions of the actual learning process; and student restlessness, tension, and personal conflicts are at healthier, nondisruptive levels.

Supporting References. In addition to the references listed earlier for Generalization V, these seven references offer more specific support for this generalization: 54, 9, 24, 2, 31, 15, 17. Reference 54 is noteworthy in that a three-year study of an inner-city elementary school in Chicago with a long history of student behavior problems showed that both the magnitude and the number of behavior problems could be significantly reduced. Problem behavior, heretofore assumed to be determined by the family and community environment, was effectively changed in school settings where teachers work with fewer students.

Generalization VIII: Teacher attitude and morale are more positive when teachers work with fewer rather than more students.

Teachers experience higher degrees of personal satisfaction, a greater sense of achievement, and more genuine enjoyment in teaching. They are less exhausted at the end of a day. Large numbers of students have been found to adversely affect such positive teacher feelings. Teachers become frustrated and depressed and actually undergo serious nervous strain when they have too many students.

Large classes and more students also mean more interpersonal tranactions and responsibility, increased paper work, more involved planning for effective use of time, more behavior problems to contend with, and less personal time for self-renewal. Such conditions generalize to overall dissatisfaction with teaching as teachers literally wear down and are barely able to cope on a day-to-day, crisis-to-crisis basis.

Supporting References. Ten references support this generalization: 9, 24, 43, 41, 31, 36, 2, 42, 58, 69.

Generalization IX: Student attitudes and perceptions are more positive when teachers work with fewer rather than more students.

Students are more favorable to their teachers and to the instruction they receive. In addition, because they see their instructors in a greater variety of roles, they are better able to clarify their ideas and feelings about them.

Students have greater trust and confidence in their peers and the teacher. This causes them to have greater confidence in themselves, and consequently they feel freer to participate in discussion. Fears about not being able to say what they mean or being wrong are less in evidence.

Supporting References. There is not as much support for this generalization as for most of the others, particularly if corroborating information from references in the human and interpersonal relations areas are not included. Scientific studies of public school environments and the effects on students' attitudes and perceptions are comparatively few. Doubtless this is to considerable extent due to the measurement problems inherent in this complex area. Six references support this generalization: 1, 7, 16, 21, 22, 69.

About Studies Not Cited.

The individual studies cited in support of the generalizations are not those containing evidence in support of placing more students with fewer teachers, i.e., larger class size. This selectivity was intentional.

The vast majority of such studies fail to meet basic standards for such inquiry (67, 6). Frequently, two or more of the following deficiencies are characteristic of those studies which appear to favor larger classes:

1. A limited single criterion was used as the standard for judgment, usually a norm-referenced achievement test.

2. Specific school objectives, multiple teacher objectives (especially affective and psychomotor), or academic knowledge and skill growth of individual students were not taken into account.

3. The period of study was short-term - - too short for behavior change to be measured accurately or for the desired behavior to be demonstrated.

4. Atypical conditions and/or new or different instructional procedures instituted for the study rather than the size of class influenced the outcomes in the experimental groups.

5. The quantity and types of supportive staff services available - - resource centers, multimedia learning devices - - were not taken into account or controlled. That is, the impact (if any) of classroom specialists, tutors, and aides or of resource centers, multimedia learning devices, libraries, or diagnostic-prescriptive services was not determined.

6. There were no adequate controls for differences among individual learners. Thus variations in students' intellectual, cultural, social, emotional, or academic backgrounds, values, and skills influenced study results.

7. Teacher methodology, style, and technique were not adequately controlled. In some studies it was neglected; in others it was "artificially" induced, e.g., teachers were required to use one method for an entire teaching period. No provision was made for teachers to employ methods or learning activities to match specific teacher and student objectives.

In addition, two somewhat related problems exist in a number of studies:

1. Results of studies with widely different purposes have been improperly related to the class size issue, especially those of school administrative structures and organizational arrangements. Team teaching, open-space arrangements, flexible scheduling, differentiated staffing, and the like are separate phenomena and have been shown to have their own peculiar and widely varying effects on teaching and learning. To relate these directly to class size is not justifiable.

2. Mistakenly, much credence has been given to studies from other countries (largely England) and in arenas different from elementary and secondary schools, i.e., higher education. Educational purposes are not comparable in these widely varying systems and levels. Characteristics of staff and students are different, school organization for instruction is different, and goals and objectives are at wide variance.

SUMMARY

The purpose of Dr. Martin N. Olson's paper was to document the constructive things that take place when teachers work with fewer students. The research results were summarized so that educators and public alike can become aware of the type and number of positive educational outcomes which might be expected in small classes. This information can provide a focus for teachers and others in their efforts to attain desirable, agreed-on outcomes.

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